1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a SOD123W small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: I_{F(AV)} ≤ 2 A
- Reverse voltage: V_R ≤ 40 V
- Low forward voltage
- High power capability due to clip-bonding technology
- Small and flat lead SMD plastic package
- AEC-Q101 qualified
- High temperature T_i ≤ 175 °C
- · Capable for reflow and wave soldering

3. Applications

- · Low voltage rectification
- · High efficiency DC-to-DC conversion
- Switch mode power supply
- Reverse polarity protection
- Low power consumption applications
- High temperature applications

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
I _{F(AV)}	average forward current	δ = 0.5 ; f = 20 kHz; $T_{amb} \le 110$ °C; square wave	[1]	-	-	2	A
		δ = 0.5 ; f = 20 kHz; $T_{sp} \le 165$ °C; square wave		-	-	2	A
V_R	reverse voltage	T _j = 25 °C		-	-	40	V
V _F	forward voltage	I _F = 2 A; T _j = 25 °C		-	430	490	mV
I _R	reverse current	V _R = 40 V; T _j = 25 °C		-	25	100	μΑ

[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al₂O₃, standard footprint.



5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	1 2	1 🔂 2
2	Α	anode	CFP3 (SOD123W)	sym001

^[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4020ETR	CFP3	plastic, surface mounted package; 2 terminals; 2.6 mm x 1.7 mm x 1 mm body	SOD123W

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4020ETR	C1

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V _R	reverse voltage	T _j = 25 °C		-	40	V
I _{F(AV)}	average forward current	δ = 0.5 ; f = 20 kHz; $T_{amb} \le 110$ °C; square wave	[1]	-	2	Α
		δ = 0.5 ; f = 20 kHz; $T_{sp} \le 165$ °C; square wave		-	2	Α
I _{FSM}	non-repetitive peak forward current	t_p = 8 ms; $T_{j(init)}$ = 25 °C; square wave		-	50	Α
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[2]	-	680	mW
			[3]	-	1.15	W
			[1]	-	2.14	W
T _j	junction temperature			-	175	°C
T _{amb}	ambient temperature			-55	175	°C
T _{stg}	storage temperature			-65	175	°C

- Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3 , standard footprint. Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
R _{th(j-a)}	thermal resistance from junction to ambient	1	[1] [2]	-	-	220	K/W
			[1] [3]	-	-	130	K/W
			[1] [4]	-	-	70	K/W
R _{th(j-sp)}	thermal resistance from junction to solder point		[5]	-	-	18	K/W

^[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.

Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

Device mounted on a ceramic PCB, $\bar{\text{Al}}_2\text{O}_3$, standard footprint.

Soldering point of cathode tab.

40 V, 2 A low VF MEGA Schottky barrier rectifier

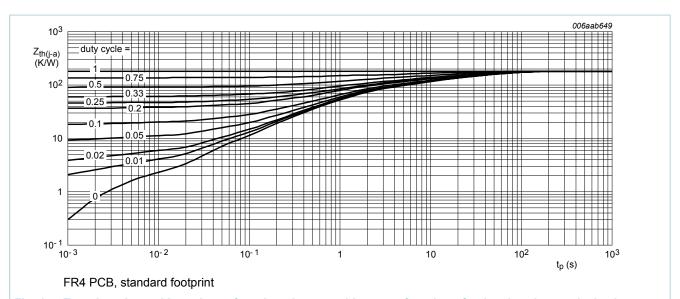


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

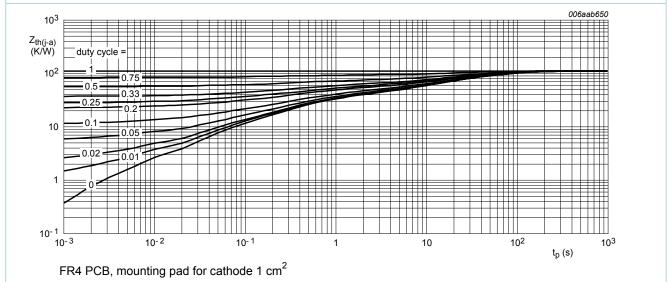
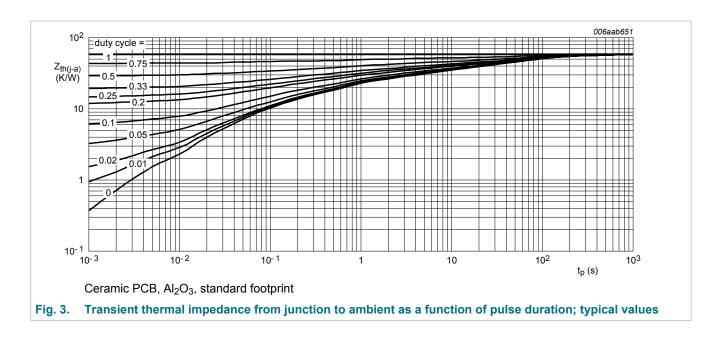


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

40 V, 2 A low VF MEGA Schottky barrier rectifier



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V _F	forward voltage	$I_F = 0.1 \text{ A}; T_j = 25 ^{\circ}\text{C}$	-	295	330	mV
		I _F = 1 A; T _j = 25 °C	-	380	440	mV
		I _F = 2 A; T _j = 25 °C	-	430	490	mV
	I _F = 2 A; T _j = 125 °C	-	330	380	mV	
I _R	reverse current	$V_R = 10 \text{ V}; T_j = 25 ^{\circ}\text{C}$	-	5	-	μΑ
		$V_R = 40 \text{ V}; T_j = 25 ^{\circ}\text{C}$	-	25	100	μΑ
		V _R = 10 V; T _j = 125 °C	-	4	-	mA
		V _R = 40 V; T _j = 125 °C	-	15	-	mA
C _d	diode capacitance	$V_R = 1 \text{ V; } f = 1 \text{ MHz; } T_j = 25 ^{\circ}\text{C}$	-	250	-	pF
		$V_R = 10 \text{ V; } f = 1 \text{ MHz; } T_j = 25 ^{\circ}\text{C}$	-	95	-	pF

5 / 13

40 V, 2 A low VF MEGA Schottky barrier rectifier

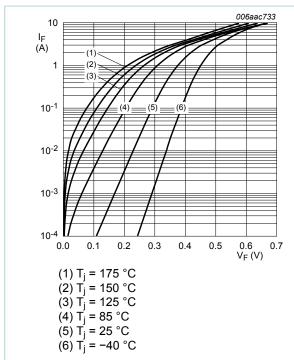


Fig. 4. Forward current as a function of forward voltage; typical values

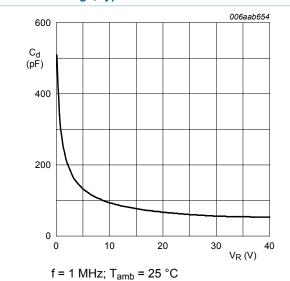


Fig. 6. Diode capacitance as a function of reverse voltage; typical values

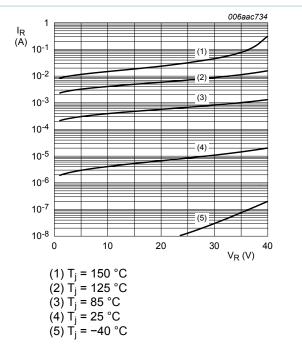
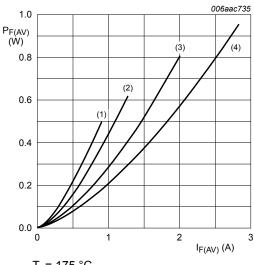


Fig. 5. Reverse current as a function of reverse voltage; typical values



 $T_j = 175 \,^{\circ}\text{C}$ (1) $\delta = 0.1$ (2) $\delta = 0.2$ (3) $\delta = 0.5$ (4) $\delta = 1.0$

Fig. 7. Average forward power dissipation as a function of average forward current; typical values

40 V, 2 A low VF MEGA Schottky barrier rectifier

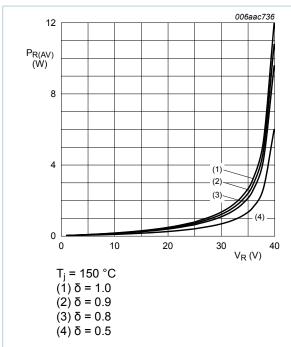
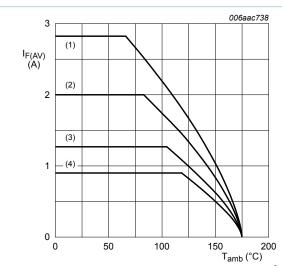


Fig. 8. Average reverse power dissipation as a function of reverse voltage; typical values



FR4 PCB, mounting pad for cathode 1 cm² T_i = 175 °C

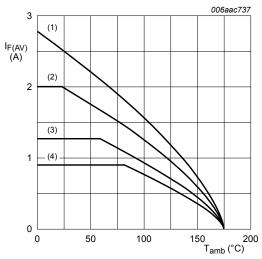
 $(1) \delta = 1.0 (DC)$

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) $\delta = 0.1$; f = 20 kHz

Fig. 10. Average forward current as a function of ambient temperature; typical values



FR4 PCB, standard footprint

 $T_i = 175 \, ^{\circ}C$

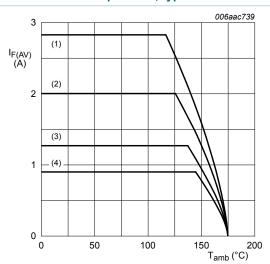
 $(1) \delta = 1.0 (DC)$

(2) $\delta = 0.5$; f = 20 kHz

(3) $\delta = 0.2$; f = 20 kHz

(4) $\delta = 0.1$; f = 20 kHz

Average forward current as a function of Fig. 9. ambient temperature; typical values



Ceramic PCB, Al₂O₃, standard footprint

T_i = 175 °C

 $(1) \delta = 1.0 (DC)$

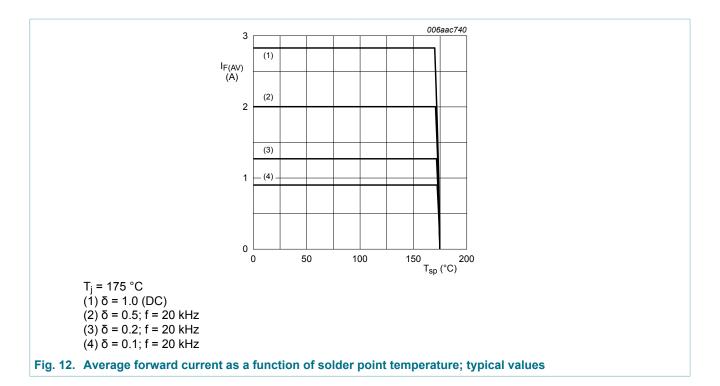
(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

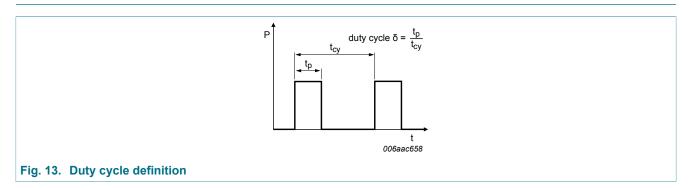
(4) $\delta = 0.1$; f = 20 kHz

Fig. 11. Average forward current as a function of ambient temperature; typical values

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11. Test information



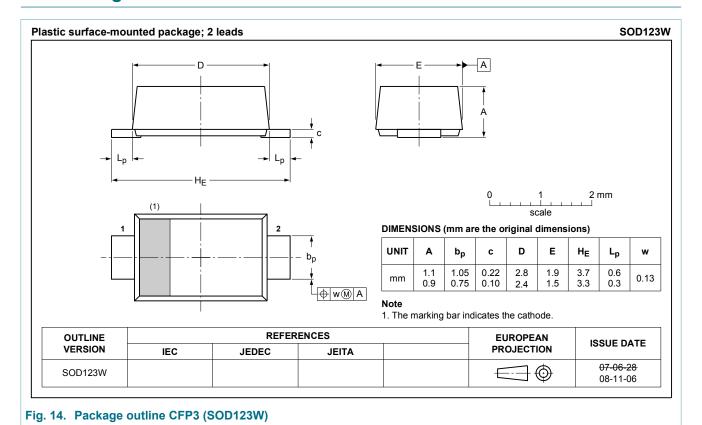
The current ratings for the typical waveforms are calculated according to the equations: $I_{F(AV)} = I_M \times \delta$ with I_M defined as peak current, $I_{RMS} = I_{F(AV)}$ at DC, and $I_{RMS} = I_M \times \sqrt{\delta}$ with I_{RMS} defined as RMS current.

Quality information

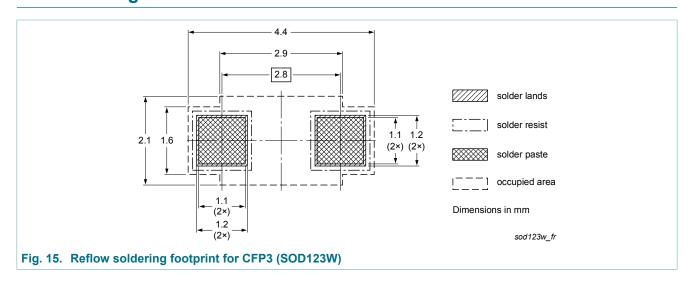
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

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12. Package outline



13. Soldering



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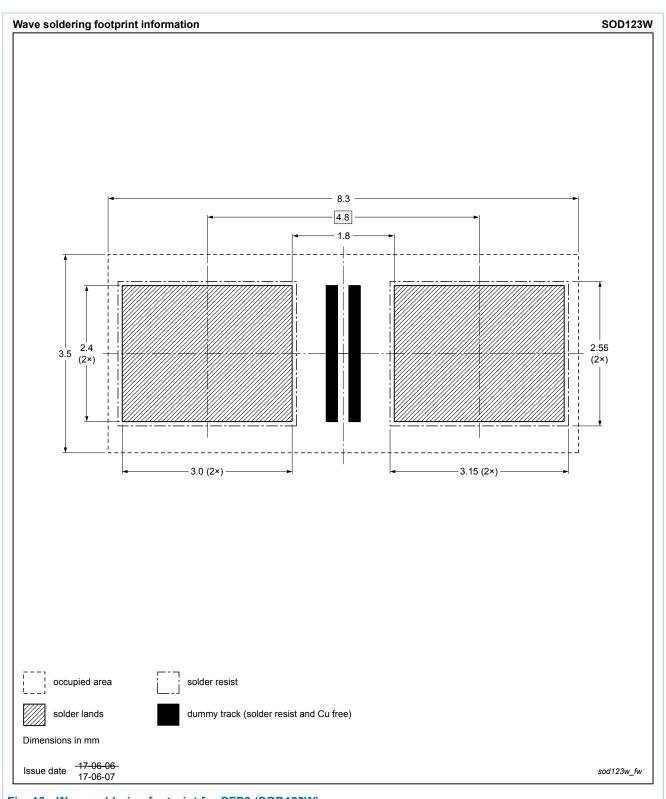


Fig. 16. Wave soldering footprint for CFP3 (SOD123W)

14. Revision history

Table 8. Revision history

- tubic of the fine to the fin							
Data sheet ID	Release date	Data sheet status	Change notice	Supersedes			
PMEG4020ETR v.3	20171113	Product data sheet	-	PMEG4020ETR v.2			
Modifications:	Legends of Figures	10 and 12 adapted					
PMEG4020ETR v.2	20171109	Product data sheet	-	-			

11 / 13

15. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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40 V, 2 A low VF MEGA Schottky barrier rectifier

16. Contents

1.	General description	1
2.	Features and benefits	1
3.	Applications	1
4.	Quick reference data	1
5.	Pinning information	2
6.	Ordering information	2
7.	Marking	2
8.	Limiting values	3
9.	Thermal characteristics	3
10.	Characteristics	5
11.	. Test information	8
12.	Package outline	9
13.	. Soldering	9
	Revision history	
	Legal information	

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